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FORESTRY IN THE PUBLIC SCHOOLS.

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FORESTRY IN THE PUBLIC SCHOOLS.

INTRODUCTORY.

It is not the object of this circular to advocate the addition of another study to the public school curriculum. In many cases it is already too cumbersome. But with the changes in our economic, political, and social conditions, and with the progress made in the sciences, it is necessary to adapt our present courses to the new conditions. Teachers often feel that their lot is a hard one because they are required to buy new books and to attend lectures and summer schools in order that they may keep up with the continual changes. Though the teacher's salary is often incommensurate with the things required, it is very evident that teachers must keep alive to the new conditions to be of real service.

The progress of forestry and the forest movement in this country must be numbered among these changes. Teachers are now interested in the subject of forestry, and a point has been reached where it deserves attention in public school teaching. The text-books which should give a place to it are generally far behind the movement and revisions should remedy this as new editions come out. There is now but little reason for the appearance of geographies, botanies, and certain other texts without a just share of the space devoted to forestry. On the other hand the energetic teacher will not wait for a new text, but will secure the necessary information and present it to the classes.

Forestry should not be taught in the public schools as a separate study, nor should it take up technical details of the actual practice of forestry except to a limited extent in agricultural high schools. Where, then, does it belong? The answer to this question should be sought in the ultimate object of all public school instruction. It is sometimes forgotten that the business of teaching is not the mere presentation of facts, but to train the mind and body in such a manner that the child can cope successfully with the problems, private and public, which later confront him in his daily life as a citizen. Teachers can not accomplish this end unless they correlate the work of the school with the things going on in the world outside.

The child should be made to take an active interest in the important problems before Americans as a people, and be set to thinking about these problems in connection with his school work. If a teacher of history does not interest his pupils in the coming elections and cause them to apply their past instruction to the questions which should decide the vote, he fails to correlate the life of the school with that of the world. Likewise, if a teacher of geography, in discussing river and harbor improvements, does not create an active interest in any local improvements that may be under way, an opportunity is missed. Thus forestry should be taught as an integral part of related subjects. The work of the school should treat forestry as one of the important economic and public questions in the life of the world.

Teachers are aware that there are now before the people many problems which are interwoven with forestry, and that our citizens are seeking information to enable them to act wisely when these problems confront them.

It is unfortunate that little is now taught in the public schools which the teacher can use as a foundation for inculcating right views concerning these problems. For example, suppose the teacher lives in a little town on the Ohio River—a town that is being menaced by ever-increasing floods. The teacher of geography may tell pupils that these floods are due to the removal of the forests from the Appalachian Mountains, and that, as the forests are further removed, the floods will become worse and worse; but the pupils have possibly not been taught anything about the influence of forests upon stream flow and so do not really understand the situation. They are told a bare external fact and that is the end of it.

But suppose they had been taught in their nature-study work to observe what becomes of rain water and snow water, how exposed soil is washed and gullied, and whither the muddy little torrents transport their burden; how various kinds of vegetation modify these effects; how gently the rain falls and how slowly the snow melts in the woods, and how absorptive is the forest soil—in other words, the every-day facts of erosion as they may be seen in every child's dooryard. Can it be doubted that the lesson of the flood as related to forest destruction would come home in terms of living experience?

The object of this circular is to indicate to teachers who are interested the courses in which forestry deserves a place and to assist them in choosing the proper subject-matter. In order not to burden them with undue expense and a great amount of extra work, references in the following suggestions are restricted to inexpensive books and pamphlets, which state the thing simply and concisely; many of them can be obtained free from the Forest Service at Washington, D. C.

The accompanying outlines, though necessarily incomplete, have still been made exhaustive enough to be of assistance to teachers who care to get at some of the details of the subject. It is not expected that text-books can ever treat the matter so fully, or even that the details will be taken up in class work except as occasion presents itself for practical application to the subject-matter of a lesson. In making use of the suggestions it is taken for granted that the teacher will, of course, consider the surrounding conditions and the age of the pupils and their previous training.

A set of well-selected forest pictures and other illustrative material will greatly help to bring home many of the points suggested. The Forest Service can furnish sets of pictures at small cost. Application should be made to the Forester, Forest Service, Washington, D. C.

COURSES IN WHICH FORESTRY SHOULD BE INTRODUCED.

Below the secondary schools forestry should form part of nature study, arithmetic, and general geography; in the high school, of United States history, civics, physical geography, commercial geography, botany, agriculture, and wood working.

NATURE STUDY.

The object of all nature study is to train the powers of observation and induction. For this purpose the forest offers opportunities that are almost unparalleled: (1) The forest and its inhabitants naturally appeal to a child of the nature-study age; (2) it is so widely distributed that it is within reach of nearly every school; (3) it is one of the easiest objects in which to create a sustained interest; (4) it offers an endless field of simple material.

Such points as germinating tree seeds, transplanting young seedlings, seed production and seed distribution, seeds as the food of animals, the growth of the plant, competition, the forest as a protection to the soil, and the characteristics of the most common trees can all be taken up in a simple manner. These are points in which the child will show an extreme interest. It is hardly necessary to mention the work that is now being done with children's gardens. How much more valuable can these studies be made if a few forest tree seeds are used with the others. The young plants can be taken home by the children and transplanted in a favorable place, where the child may watch them grow from year to year. Here is a means for sustaining the child's interest almost indefinitely, perhaps throughout his entire life. It is something which will become personal with him, and his interest will be as lasting as anything he can get from his nature-study work.

GENERAL GEOGRAPHY.

Some of the common school geographies already contain short discussions upon the forests of our country and the importance of forestry, and others are now being revised. Special reference should be made to the conditions in the region where the geography will be used. This should be followed by a paragraph on the National Forests, their creation, purpose, and use. The following outline is submitted for teachers who may not have the new geographies and for supplementary work:

A. The forests of the locality in which you are teaching.
    I. Economic value.
        1. As sources of useful products.
        2. For conservation of water. (Irrigation, water power, town and city supplies, etc.)
        3. For protection. (Floods; hot, cold, and drying winds.)
        4. Influence on erosion and soil protection.
    II. Location, extent, and character of these forests.
        1. On what kind of land (hilly, rocky, sandy, swampy, or agricultural).
        2. Character and use.
            a. Softwoods[a] or hardwoods.[b]
            Virgin or lumbered.
            Dense, thin, or open.
            Mature or immature.
            b. How utilized—conservatively or destructively; for saw timber, fuel, or other purposes.
    III. Protection of forests.
        1. Forest fires.
            a. Season of the year they occur. What are the causes?
            b. State legislation concerning forest fires. Methods of protection—State, National, and private.
            c. Precautions individuals should take against fires.
        2. Grazing.
            a. Damage to forest.
B. The forests of your State.
    I. General.
        1. Approximate proportion of State forested.
        2. Principal forest products.
        3. Relation to important industries of the State.
        4. Forest planting in the State—public and private.
    II. Forest reserves.
        1. Location and size of State reserves and National forests.
        2. Purpose of the reserves.
C. The forests of the United States.
    I. General.
        1. Approximate proportion of the United States forested.
        2. Principal forest regions.
        3. Principal forest products.
        4. Relation to important industries of the country.
    II. National Forests.
        1. General location.
        2. Purposes.

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[a] Practically, conifers or evergreens.

[b] Nearly equivalent to deciduous, broad-leafed trees.

ARITHMETIC.

Little need be said here regarding problems concerned with the measurement of wood in log and board measure, since all good arithmetic texts have such problems. Measuring the forest crop before it is cut entails expert work which no teacher may reasonably expect to impart to children of the ordinary public school age. However, it might be valuable to include in texts a statement of the general methods employed in calculating the amount of timber on a given tract and present and future values of forest crops.

UNITED STATES HISTORY.

In Fiske's History of the United States Mr. F. A. Hill says:

> To the teacher: * * * At the outset he should try to lead the learner to see that the real history of a people includes everything about them; that it is, therefore, an aggregate of innumerable facts; that it is impossible, as it would be undesirable, for the most painstaking historian to present all these facts, or a millionth part of them; and that whoever has anything to do with history is compelled to select his materials from infinite details. Such selection becomes possible because historic facts are not of equal value. The historian fixes upon those only which he thinks will help show the grander features of a people's origin, rise, progress, and vicissitudes.

There are perhaps few natural conditions that have had a greater influence upon the economic, social, and political development of the country than its forests. The development of all of the larger industries was dependent upon a ready supply of wood. The little villages which sprang up everywhere and grew rapidly into big, bustling commercial centers could never have made such phenomenal growth without ready access to the products of the forest. Throughout the wooded territory the sawmill followed close upon the heels of the first settler, and it was generally the sawmill that marked the location of a new center of industry.

Wood forms the framework upon which practically all great industries have been built. The influence of the forest upon "the grander features of a people's rise and progress" is often overlooked by historians. Surely, that influence has not been less potent than many of the features treated in text-book and class room.

The future progress of the country, nay, even the maintenance of the high state of economic and industrial development it has attained, is largely dependent upon a future supply of timber. All industries are using wood in increasing quantities every year, and anything like a timber famine would cripple them so that America would stand in danger of losing its place among the leading nations of the world. President Roosevelt, in a recent public address, said: "The forest problem is, in many ways, the most vital internal problem in the United States."

The greatest benefit to be derived from a study of the past is the help it gives us in wisely meeting the problems of the present and future. In the face of present conditions it is apparent that the influence of the forest upon the country's development deserves considerable attention in a general course of United States history.

Because such a course is so crowded with important events that it can devote little space to each one, the points here suggested must be treated briefly.

OUTLINE FOR STUDY.

A. General importance of the forests to our development.
  1. Extent of the primeval forest.
  2. Importance to the settler and home builder.
  3. Importance to our industrial development.
    a. Railroads, shipbuilding, telegraph and telephone, mining, cities.
  4. The forest as an enemy.
    a. Necessity for clearing the land.
    b. Attitude resulting from the fight against the forest and its inhabitants.

B. The movement of the lumber industry westward and southward.[a]

C. The beginning and growth of the forestry movement.
  1. Awakening of sentiment. Action of societies, Arbor Day.
  2. Legislation for forestry.
    a. Timber-culture acts and their result.
    b. Act of 1891 making the creation of National Forest reserves possible. Results of this act.
    c. Relation to general land policy.

D. The National Forest policy.
  1. Proclamation of National Forests, February 22, 1897, steps which preceded, and immediate consequences.
  2. Subsequent growth of forests.

E. The Forest Service.[b]
  1. Growth and work of the Forest Service (at first the Division and later the Bureau of Forestry).

F. General location, total area, purposes, and general plan of administration of our National Forests.

CIVICS.

A knowledge of the fundamental regulations governing the public lands is of importance to good citizenship, and in regions where the people are thrown in contact with these rules such knowledge will promote helpful relations between the people and the Government officers.

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[a] This forms an excellent topic for illustrating the gradual westward trend of civilization and the influence a natural resource has upon the progression and retrogression of local development.

[b] Though no course in American history can rightfully omit the importance of agriculture and its influence upon a nation's development, there can be no doubt that it is important that children know of the development of the Department of Agriculture and something of the work it has done and is now doing. The larger constructive influences operating in the country should receive greater prominence in the study of history.

The protection of property and the policies relating to public lands should form a part of the course in civics. The use of the public domain, National Parks, and National Forests is regulated by an important form of lawmaking (using that term in its broadest sense) not usually treated in texts on civics. For example, the power to make rules and regulations governing the use of the National Forests, which do not involve title to the lands, is delegated by Congress to the Secretary of Agriculture. Rights and uses involving title to the land are under the jurisdiction of the Secretary of the Interior.

OUTLINE FOR STUDY.

A. The protection of property in relation to the forest.
  1. Against trespass, fire, grazing.
  2. Town, county, State, and national officers.
B. General land policy.
  1. Homestead rights, timber claims, mineral claims (etc.).
C. National parks.
  1. Purpose.
  2. Administration.
D. National and State forests—Forest policy.
  1. Purpose of public forests.
  2. How created.
  3. Administration.
    a. Jurisdiction.
    b. Special uses.
    c. Sale of timber.
    d. Right to homestead.

PHYSICAL GEOGRAPHY.

It is now an established fact that the forest has a marked influence upon the climate, water supply, sanitary conditions, and physiographic features of the earth. It is the object of physical geography to treat of the interrelations of climate, relief, and animal and plant life. Hence no course in physical geography is complete unless it devotes a just share of the time to the influences of the forest. So far-reaching are these influences and so many are the problems which are dependent upon the forest for a solution that this subject should be given considerable prominence. Indeed it would not be overstating the case to say that its importance is on a par with many of the main subjects treated, and that, in the revision of texts, it should be given a chapter by itself.

OUTLINE FOR STUDY.

A. The relation of forests to climate.
  1. General influences.
  2. Soil and air temperatures within and without the forest.
  3. Humidity.

B. Influence of forests upon water and soil conditions.
    1. Run-off and seepage.
    2. Springs.
    3. Stream flow (floods, water power, navigation, purity of water supply).
    4. Soil conditions (fertility and influence on agriculture).

C. Relation of forests to erosion.

D. Reclamation.
    1. Importance.
    2. Fixation of shifting sands.
    3. Reclaiming the arid West—Irrigation.
    4. Relation of forests to reclamation.
    5. Reclamation projects.
    6. Forest planting.

COMMERCIAL GEOGRAPHY.

Forest products are second only to foodstuffs, and so have always had an important place in text-books on the geography of commerce. But here again the progress of forestry has been so rapid that changes and additions are now necessary. Besides maps showing the distribution of forests and the forest regions of the country, others should be made which will show the main lumbering and export centers with the territory which they supply, the larger cities, and the National Forests.

Statistics, tables, and maps in a text of this kind are apt to become out of date in a very short time, but with the work now going on in the Forest Service in cooperation with the Bureau of the Census the teacher will be able to keep up to date by applying for the proper reports.

Outline for Study.

A. Importance of forests as a national resource.
    1. General, i. e., compared to other resources.
    2. Statistics regarding standing timber.
    3. The past and future of our forests.
    4. The relation of forestry to the timber supply.
    5. The forestry movement and its results.

B. The distribution of forests.

C. The products of the forest—(methods of harvesting and manufacturing).
    1. Lumber.
    2. Furniture stock.
    3. Veneering.
    4. Railroad ties.
    5. Mine props.
    6. Staves, shingles, and lath.
    7. Poles and piles.
    8. Wood pulp.
    9. Gums, resins, and turpentine.
    10. Rubber, dye stuffs, quinine, cork, silk, vanilla, tannin, maple sugar.

D. The influence of forestry on commerce.
    1. On the general timber supply.
    2. On agricultural products.
    3. On water powers and city water supplies.
    4. On navigation.
E. Tables of statistics.
F. Maps.

BOTANY.

The nature of botany is such that references must be made to the forest and forest trees from time to time throughout the entire course. Furthermore, the forest is a plant society, and as such becomes directly a part of the studies in ecology. There is perhaps no better opportunity for studying the delicate adjustments of plants to their surroundings than in the relation of trees, shrubs, and herbs to one another, as shown in the forest of mixed growth. Where can one find a better opportunity than in the forest to make an object lesson of the light relation, the struggle for occupation of the soil, the distribution of seed, the germination of seed, and the economic importance of fungi? It is impossible to enumerate the opportunities that the forest offers to teachers of botany.

Though it is hardly advisable to advocate a separate chapter on the natural history of the forest for text-books of botany, it might be well to include the main points of that subject in a short section under Plant Societies.

The practical side of botany, aside from its importance as a study for general culture and training, lies mainly in its bearing on the arts, such as medicine, agriculture, horticulture, and forestry. The cultural methods used to raise trees are entirely dependent upon botany, and the teacher will find that a large fund of practical applications can be derived from the fundamental principles of tree culture. It is these practical applications which hold a student's interest, and by making use of them wherever an opportunity presents itself the teacher can correlate the work of the class room with the problems to be met in the world.

WOOD WORKING.

Many teachers having charge of wood working in connection with manual training are beginning to feel that such a study should include something of the history of a piece of lumber before it reaches the laboratory and the structural, physical, and mechanical properties of wood.[a]

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[a] Some teachers may include studies in the identification of trees, though such studies really belong to nature study and botany.

The accompanying outline is quite suggestive in itself, and will show without further comment the value of a knowledge of the properties of wood to a student of wood working.

A. Logging and milling.
    I. The log from the stump to the mill.
        1. General methods of logging.
        2. Conservative methods.
    II. Milling.
        1. Sawing.
        2. Handling sawed lumber—drying, seasoning.
        3. Using waste.
B. The properties of wood.
    I. Structural properties.
        1. External form of the tree.
        2. Gross structure of the wood (wood elements)—pith, annual rings, pith rays, spring and summer wood, sap and heart wood.
        3. The relations of the wood elements in cross, radial, and tangential sections.
    II. Physical properties.
        1. Defects—shake, frost cracks, knots, burls, rot, season checks, resin pockets, pitch streaks, insect holes, heart breaks.
        2. Grain—coarse, fine, even, uneven, rough, smooth, straight, cross, spiral, wavy or curly, mottled, bird's-eye, and quarter-sawed or silver grain.
        3. Color, gloss, odor, taste.
    III. Mechanical properties.
        1. General—elasticity, flexibility, toughness, hardness, strength.
        2. Factors influencing strength—defects, size of timber, relation of the cross section to the annual rings, moisture, rapidity of growth, proportion of summer and spring wood, point of application of load.
        3. Shrinking and swelling.
    IV. Identification of the more common commercial woods based on the properties of the wood.
    V. Seasoning.
        1. Importance.
        2. Air seasoning.
        3. Water seasoning.
        4. Kiln drying.
    VI. Preservative treatment of wood.
        1. Causes of decay.
        2. Common methods of treatment.
        3. Results of treatment.

AGRICULTURE.

Agriculture as a study in the public schools is at present undergoing a radical change. According to the modern view of education the child of the rural districts has been given, on the one hand, little more than a meager training for the problems of a city life, and, on the other hand, the best opportunities for fitting him to improve the conditions of his own surroundings have been largely overlooked.

Continued study in a city high school often unfits the child for meeting the problems of the farm and awakens in him a desire for city life. Whenever a city school draws upon a considerable rural population it should offer well-selected agricultural studies and maintain a teacher who is a graduate of an agricultural college. In some schools, where the time devoted to agriculture must be short, it has been found that much can be gained by transferring the chief agricultural courses to the senior year. Thus, all preliminary work can be disposed of quickly by a brief review of those parts of botany, zoology, physiography, and chemistry which form the basis of the science of agriculture, and more time can be devoted to the practical side of the question.

The relation of the forest (the farm woods, or woodlot) to the farmer is important in a course in agriculture. It should be treated (1) from the standpoint of the influence of the forest upon the farm and (2) from the standpoint of an agricultural crop. Subjects coming under the first heading can readily be taught by making a practical application of forest influences as studied in physical geography. Those under the second heading will need to be studied from the viewpoint of cultural methods, and can draw upon botany for their foundation material. The importance of the subject suggests a separate chapter for text-books.

Outline for Study.

A. General importance of forestry to farmers.
    I. Forest influence as related to the farmer.
    II. The woodlot as a source of supply.
B. The meaning of forestry.
    I. An explanation of the term forestry.
    II. Principles underlying the art of forestry.
C. The forests of the United States.
    I. General forest regions.
        1. The division of the country into regions.
        2. The forest types of each region, with special reference to local conditions.
            a. Commercial species.
            b. Size and ownership of tracts.
            c. Location with reference to soils, topography, etc.
            d. Character of the forests: Softwoods or hardwoods; Virgin, culled, or second growth; Seedling, or sprout forests; Dense, thin, or open; Mature or immature; Plantations.
            e. Use: Conservatively or destructively; Saw, timber, fuel, or other uses.

- *D*. The forest as a crop.
    - I. The woodlot a source of supply.
    - II. Caring for the woodlot.
        - 1. Protection.
            - *a*. Forest fires. Nature of damage; season of occurrence; causes; legislation for protection.
            - *b*. Grazing. Nature of damage; legislation.
            - *c*. Trespass. Rights of property owners; legislation.
        - 2. Thinning.
        - 3. Reproduction.
            - *a*. Natural methods.
            - *b*. Planting.
        - 4. Harvesting the crop.
            - *a*. Methods of cutting, marketing, etc.
        - 5. Planting.
            - *a*. Advisability.
            - *b*. The forest nursery.
            - *c*. Transplanting.
            - *d*. Thinning.
- *E*. The taxation of woodlots.
- *F*. Exercises for laboratory and field work.

Approved:

James Wilson, *Secretary of Agriculture.*

Washington, D. C., *October 10, 1907.*

APPENDIX.

REFERENCES.

The following list of references is designed to meet the requirements of teachers. For that reason much has been omitted which is interesting and instructive, yet is not necessary for the general knowledge of forestry which the teacher is seeking.

In some cases the references are only of local importance and so may not be of value to teachers residing outside of the regions to which the publications refer.

Application for publications of the Forest Service named in this list, except those with a price affixed, may be made to The Forester, United States Department of Agriculture, Washington, D. C. Those with a price affixed are not at the disposal of the Forest Service and can be obtained only by purchase. Remittance should be made by postal money order (stamps not accepted) directly to the Superintendent of Documents, Government Printing Office, Washington, D. C. Order by title and the number of the bulletin or circular.

For publications not issued by the Department of Agriculture applications should be made to the publishers.

GENERAL.

Publications of the United States Department of Agriculture.

Bulletin 24. A Primer of Forestry, in two parts (bound in cloth). Part I—The Forest. (Price, 35 cents.) Part II—Practical Forestry. (Price, 30 cents.) A general discussion of the subject, treated in a simple and concise manner.
Farmers' Bulletin 173. A Primer of Forestry (paper). A reprint of Bulletin 24, Part I.
Circular 25. Forestry and the Lumber Supply.
Circular 35. Forest Preservation and National Prosperity.
Circular 36. (Fourth edition.) The Forest Service: What It Is and How It Deals with Forest Problems.
Circular 96. Arbor Day.
Extract 329, from the Yearbook of the Department of Agriculture (1903). The Relation of Forests to Stream Flow.
Bulletin 17. Check List of the Forest Trees of the United States. (Price, 15 cents.)
Bulletin 61. Terms used in Forestry and Logging.
The Use of the National Forests (bound).

Publications not issued by the United States Department of Agriculture.

Apgar. Trees of the Northern United States. New York, N. Y.
Gifford, John. Practical Forestry. New York, 1902.
Green, S. B. Forestry in Minnesota; The Minnesota Forestry Association, George W. Straud, Secretary, Taylors Falls, Minn.
Roth, Filibert. A First Book of Forestry. Boston, 1902.
Smith, Herbert A. Saving the Forests; Geographic Magazine. Published by the National Geographic Society, Washington, D. C. Vol. 18, No. 8, 1907.
Trotter. Geography of Commerce. New York.

NATURE STUDY, BOTANY, AND AGRICULTURE.

Publications of the United States Department of Agriculture.

Bulletin 29. The Forest Nursery.

Farmers' Bulletin 134. Tree Planting on Rural School Grounds.

Circular 105. White Oak in the Southern Appalachians (good for general work in tree studies).

Forest Planting Leaflets. (Circulars 54–77, 82–95, and 106.) These leaflets, besides giving information in regard to planting, are excellent aids to studies of the different kinds of trees.

54. How to Cultivate and Care for Forest Plantations on the Semi-Arid Plains.
55. How to Pack and Ship Young Forest Trees.
56. Bur Oak.
57. Jack Pine.
58. Red Oak.
59. Eucalypts.
60. Red Pine.
61. How to Transplant Forest Trees.
62. Shagbark Hickory.
63. Basswood.
64. Black Locust.
65. Norway Spruce.
66. White Elm.
67. White Pine.
68. Scotch Pine.
69. Fence Post Trees.
70. European Larch.
71. Chestnut.
72. Western Yellow Pine.
73. Red Cedar.
74. Honey Locust.
75. Hackberry.
76. Silver Maple.
77. Cottonwood.
82. Hardy Catalpa.
83. Russian Mulberry.
84. White Ash.
85. Slippery Elm.
86. Boxelder.
87. White Willow.
88. Black Walnut.
89. Tamarack.
90. Osage Orange.
91. Coffeetree.
92. Green Ash.
93. Yellow Poplar.
94. Black Cherry.
95. Sugar Maple.
106. White Oak.

Bulletin 63. The Natural Replacement of White Pine on Old Fields in New England. (Price, 10 cents.)

Publications not issued by the United States Department of Agriculture.

Gifford, John. Practical Forestry. New York, N. Y. Chapter III.

Hodge. Nature Study and Life, Chapters XXII and XXIII. Boston, 1902.

Jackman. Nature Study for Grammar Grades. New York, N. Y. Chapters VII, VIII, and XXXI.

James. Practical Agriculture. New York, N. Y. Chapter XXXVIII.

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Extracts from Yearbooks of the Department of Agriculture:

187. The Practice of Forestry by Private Owners (1899).
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270. Practicability of Forest Planting in the United States (1902).
376. How to Grow Young Trees for Forest Planting (1905).

The following are chiefly of local importance:

Circular 37. Forest Planting in the Sand-Hill Region of Nebraska.
Circular 41. Forest Planting on Coal Lands in Western Pennsylvania.
Circular 45. Forest Planting in Eastern Nebraska.
Circular 81. Forest Planting in Illinois.
Circular 99. Suggestions for Forest Planting on the Semi-Arid Plains.
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PHYSICAL GEOGRAPHY.

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Bulletin 44. The Diminished Flow of the Rock River in Wisconsin and Illinois and Its Relation to the Surrounding Forests.
Bulletin 49. The Timber of the Edwards Plateau of Texas. (Very technical.)
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Bulletin 74.[a] Forest Products of the United States: 1905 (price 15 cents); Consumption of Tanbark in 1905; Cross-Ties Purchased by the Steam Railroads of the United States in 1905; Wood Used for Pulp in 1905; Timber Used in the Mines of the United States in 1905; Wood Used for Distillation in 1905; Wood Used for Veneer in 1905; The Lumber Cut of the United States in 1905; Wood Used for Tight Cooperage Stock in 1905; Woods Used for Packing Boxes in New England.
Circular 97. The Timber Supply of the United States.
Circular 107. Sawmill Statistics.
Table. Production of Lumber, Lath, and Shingles, by States and Species, 1906, 1905, and 1904.
Bulletin 40. A New Method of Turpentine Orcharding.
Bulletin 59. The Maple Sugar Industry. (Price 5 cents.)
Farmers' Bulletin 252. Maple Sugar and Sirup.
Circular 34. Practical Results of the Cup and Gutter System of Turpentining.

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[a] Circulars relating to the statistics of forest products are prepared each year and can be had free of charge. They will enable teachers to keep their work up-to-date.

Publications not issued by the Department of Agriculture.

Adams. A Commercial Geography. New York, N. Y.
Gifford, John. Practical Forestry. New York. Chapters VIII and IX.
Roth, Filibert. A First Book of Forestry. Boston, pp. 217–238.
Trotter. Geography of Commerce. New York, N. Y.

HISTORY AND CIVICS.

Publications of the United States Department of Agriculture.

The Use of the National Forests.
Circular 36. (Second edition.) The Forest Service: What It Is and How It Deals with Forest Problems.
Bulletin 57. Federal and State Forest Laws. (Price 15 cents.)

Note.—Many States publish circulars relating to the laws and officers concerned with the protection of forest property. For these write to the State officer charged with forest work.

Publications not issued by the Department of Agriculture.

Gilbert. Geographic Influences in American History. Boston.

WOOD WORKING.

Publications of the United States Department of Agriculture.

Bulletin 71. Rules and Specifications for Grading Lumber. (Price 15 cents.)
Circular 25. Forestry and the Lumber Supply.
Bulletin 10. Timber: An Elementary Discussion of the Characteristics and Properties of Wood. (Price 10 cents.) A pamphlet that should be read by every teacher of wood working.
Bulletin 41. Seasoning of Timber.
Bulletin 70. Effect of Moisture on the Strength and Stiffness of Wood. (Price 15 cents.) Very technical.
Circular 48. Kiln-Drying Hardwood Lumber.
Circular 98. Quantity and Character of Creosote in Well-Preserved Timbers.
Circular 101. The Open-Tank Method for the Treatment of Timber.
Circular 104. Brush and Tank Pole Treatments.
Extract 374, from the Yearbook of the Department of Agriculture for 1902. The Influence of Forestry on the Lumber Industry.

Publications not issued by the Department of Agriculture.

Foster. Elementary Woodworking. Boston.

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